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offset by the better method of classroom instruction. The result, then, is that the blame that should fall on the working-conditions is laid on the method itself, and ultimate progress is really rather retarded than advanced by such sporadic experiments.

Miss Ballard suggests, indeed, that the book can be used for oral work "no matter what other textbooks are appointed." This is true, and a little oral work cannot help proving beneficial with any method. But in the interest of real progress, is it at all desirable that the reform method should ever be judged in this country not on its own merits but by the incidental results obtained when it is grafted upon other methods, whose fundamental principles may actually be diametrically opposed to its own?

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*Educational Psychology.* By EDWARD L. THORNDIKE. 2d ed. New York: The Science Press, 1911.

In this second edition the material which was presented in the first edition is completely recast and somewhat enlarged. The aim is the same as in the first edition, namely, to present the results of investigations—mainly by the statistical method—of the influence of heredity and of environment upon mental traits, and of individual differences in mental traits. In the second edition the arrangement of chapters has been made more systematic and several chapters have been omitted. The character of these changes indicates that the author's conception of his task has become clearer and more unified. Besides these changes the book is rewritten throughout, and is brought down to date by the discussion of investigations which have been made since the publication of the first edition. This book stands alone in the field which it covers, and the new edition is welcome.

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*Plant Physiology, with Special Reference to Plant Production.* By BENJAMIN M. DUGGAR. New York: Macmillan, 1912. Pp. xv+516. \$1.60 net.

Professor Duggar has undertaken the task of presenting the essentials of plant physiology as they relate to crops. It seems strange, since plants are the essential things in agriculture, that plant physiology has been so long neglected as one of the essential phases of study. In agricultural and horticultural schools chemistry has usually been the underlying scientific subject, perhaps because it was well organized at an earlier date than was botany, and therefore its relation to plant productivity more easily shown; and possibly chemistry has maintained its position as the fundamental agricultural science because of the "inertia of momentum" that it has acquired through the fact of its past use. Professor Duggar's book organizes the

facts of plant physiology in such direct relation to plant productivity that it certainly will present a strong appeal, both to general students of botany and to those who look forward to pursuits that depend upon the use and knowledge of plants. The book is designed "to consider both the student and the general reader interested alike in the fundamental requirements of plants and in plant production." The author is obviously one of that rapidly increasing number of people who believe that science does not lose but rather gains through the increased significance that is secured by a direct relation of the science study to aspects that are worth while in our fundamental industries. This point of view makes the book a most pleasing divergence from the usual organization of botany.

Provision is made for a definite study of the structures of plants, since the function of parts cannot be determined without definite knowledge of the structures by means of which functions are performed. Therefore we find the second chapter taking up the plant cell and treating such topics as appear in other texts. "The Water Content of Plants" follows, and the succeeding chapters deal largely with plant activities, always including the amount of study of structures that is essential to an understanding of functions. The ultra-cautious physiologist may object that in connection with the in-take and out-go of water and other materials from the plant too small an amount of physics and chemistry is presented, and that there is too little detail regarding important researches in the field covered. But it must be remembered that the author is presenting the significant phases of plant physiology to those who are being trained for a definite problem, a problem which has its own peculiar demands, just as has the problem of the specialist who wishes to give his life to a detailed study of the in-take and out-go of materials from the plant. For example, in a later chapter, the relatively large amount of space given to the relation of plants to destructive forms, either plants or animals, and the preventive measures necessary to obviate the decrease of productivity through parasites, is justified by the fact that this is the kind of plant physiological study that is most needed by the people for whom the author designed his book.

Throughout the book the topics are essentially those which we find in any comprehensive text on plant physiology. The very important difference between these topics here and elsewhere is that the illustrative material and the method of presentation relate directly to a specific use of the science of plant physiology.

The needs of general education demand that all our sciences shall be taught in such ways as may make their materials and methods worth while to general students. This demand has appeared in no textbook on plant physiology until the appearance of this book, and because of this the book is doubtless destined to exercise a potent influence in instruction, especially in agricultural colleges.

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